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Validation of New Combinations in Phlox 97

Mandevilla splendens 99

Notes on Cultivated Scrophulariaceæ 3. Linaria 102

Name Changes and New Species of Western American Lilies 114

A Review of the Genus Eucryphia 116

Sources of Rock Garden Plants 128

Hortus - Its Plan and Use 130

The Flowering Rush 134

Book Reviews 137

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Validation of New Combinations in Phlox

Edgar T. Wherry
University of Pennsylvania

In my book, "The Genus Phlox," published November 15, 1955, I stated on page 9 that subspecies were being designated by trinomials without interposed category symbol. This seemed to me to comply with the requirement of the "International Code of Botanical Nomenclature," of 1952, Article 54, as a "clear indication of the rank of the taxon concerned." Having now been advised that some authorities on nomenclatural matters do not accept this view, I desire to place on record such new combinations as were made, in what I trust will be a generally acceptable arrangement. Again, I considered that I was complying with Article 43 of the Code, indicating my acceptance of names by placing them in boldface type as column headings, and listing as alternative names only those previously published, but now I find that others interpret this Article differently. The names involved are included in the following list. Following each accepted combination, there is given a reference to the place of publication of the name-bringing synonym or basionym; additional literature is cited in the book.

Page

19 Phlox speciosa ssp. Woodhousei (Gray) Wherry, status novus. P. Woodhousei Torrey ex Gray, Proc. Amer. Acad. Arts Sci. 8: 256 (1879).

25 Phlox nivalis ssp. Hentzii (Nuttall) Wherry, status novus. P. Hentzii Nuttall, Jour. Acad. Nat. Sci. Phila. 7: 110 (1834).

41 Phlox divaricata ssp. Laphamii (Wood) Wherry, status novus. P. divaricata β ? Laphami Wood, Class Book Bot., ed. 2: 439 (1848).

45 Phlox pilosa ssp. ozarkana (Wherry) Wherry, status novus. P. pilosa var. ozarkana Wherry, Amer. Midl. Nat. 16: 413 (1935).

47 Phlox pilosa ssp. latisepala (Wherry) Wherry, nomen novum. P. pilosa latisepala Wherry, Gen. Phlox: 47 (1955).

49 Phlox pilosa ssp. fulgida (Wherry) Wherry, status novus. P. pilosa var. fulgida Wherry, Bartonia 12: 47 (1931).

51 Phlox pilosa ssp. detonsa (Gray) Wherry, status novus. P. pilosa var. detonsa (Gray, Proc. Amer. Acad. Arts Sci. 8: 251 (1870).

55 Phlox amoena ssp. Lighthipei (Small) Wherry, status novus. P. Lighthipei Small, Fl. SE. U. S.: 978 (1903).

Page

61 Phlox Drummondii ssp. Wilcoxiana (Bogusch) Wherry, status novus.
P. Wilcoxiana Bogusch, Torreya 29: 135 (1929).

62 Phlox Drummondii ssp. Mcallisteri (Whitehouse) Wherry, status novus.
P. Mcallisteri Whitehouse, Amer. Midl. Nat. 34: 393 (1945).

62 Phlox glabriflora ssp. Tharpii (Whitehouse) Wherry, status novus.
P. Tharpii Whitehouse, Amer. Midl. Nat. 34: 399 (1945).

63 Phlox glabriflora ssp. littoralis (Cory) Wherry, status novus.
P. Drummondii var. littoralis Cory, Rhodora 39: 421 (1937).

87 Phlox viridis ssp. compacta (Brand) Wherry, comb. nova.
P. Stansburyi ssp. compacta Brand, Engl. Pflanzenr. IV. 250: 67 (1907).

88 Phlox viridis ssp. longipes (Jones) Wherry, comb. nova.
P. linearifolia var. longipes Jones, Contr. W. Bot. 12: 53 (1908).

107 Phlox carolina ssp. alta Wherry, nomen novum.
P. altissima Moench, Meth. Pl. Hort. Marb.: 454 (1794), an invalid name.

108 Phlox carolina ssp. angusta Wherry, nomen novum.
P. glaberrima v. suffruticosa subv. angustissima Brand, Engl. Pflanzenr. IV. 250: 64-65 (1907).

110 Phlox glaberrima ssp. triflora (Michaux) Wherry, comb. nova.
P. triflora Michaux, Fl. Bor.-Amer. 1: 143 (1803).

111 Phlox glaberrima ssp. interior (Wherry) Wherry, status novus.
P. glaberrima var. interior Wherry, Bartonia 14: 19 (1932) [reference inadvertently omitted in Gen. Phlox, p. 111].

127 Phlox Richardsonii ssp. alaskensis (Jordal) Wherry, status novus.
P. alaskensis Jordal, Rhodora 54: 38 (1952).

140 Phlox griseola ssp. tumulosa (Wherry) Wherry, status novus.
P. tumulosa Wherry, Not. Nat. Acad. Nat. Sci. Phila. 113: 9 (1942).

148 Phlox multiflora ssp. patula (A. Nelson) Wherry, status novus.
P. patula A. Nelson, Univ. Wyo. Publ. Bot. 1: 48 (1924).

164 Phlox Hoodii ssp. muscoides (Nuttall) Wherry, comb. nova.
P. muscoides Nuttall, Jour. Acad. Nat. Sci. Phila. 7: 42 (1834).

Mandevilla splendens

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About twenty years ago Longwood Gardens obtained from the Mitchel Estate at Oyster Bay, New York, cuttings of a woody vine labeled Dipladenia amoena. This original stock is thought to be no longer in existence. The plant had been grown here under this name until last winter, when I sent a specimen for identification to Dr. Robert E. Woodson, Jr., at the Missouri Botanical Garden. Dr. Woodson, an authority on the family Apocynaceæ, to which the plant belongs, has identified it as Mandevilla splendens (Hooker) Woodson. He treated the species in his "Studies in the Apocynaceæ IV: The American Genera of Echitoideæ" ("Annals of the Missouri Botanic Garden" 20: 605-790 [1933]). In this paper he combined the two genera Dipladenia and Mandevilla under the latter name, without making clear his reasons for doing so. The species was originally collected in the Organ Mts. near Rio de Janeiro, Brazil. Woodson reports that it is one of numerous Dipladenias introduced into cultivation by Sander & Co. of St. Albans, England, in the past century, and that it is the only species ordinarily cultivated today.

On the strength of Woodson's identification, our plant is being treated as Mandevilla splendens. There is evidence, however, that this may not be correct. Occasionally during mid-flowering season the plants produce fruits, though, due to the structure of the flower, no one at Longwood Gardens has succeeded in pollinating flowers. The anthers are completely fused together around the stigma to the extent that attempts to emasculate the flower have resulted in the destruction of the stigma. Chance seedlings grown at Longwood Gardens differ from the parents in character of the flower. The flowers on these seedlings are somewhat smaller and much lighter in color than those on the parent. This would indicate that the parent might be a hybrid and not a true species such as Mandevilla splendens.

Dipladenia × amoena Moore was originally described in "Florist & Pomologist" for 1868, page 72, and was described as a hybrid between D. splendens and D. amabilis. Dr. Woodson, however, did not mention D. × amoena in his paper.

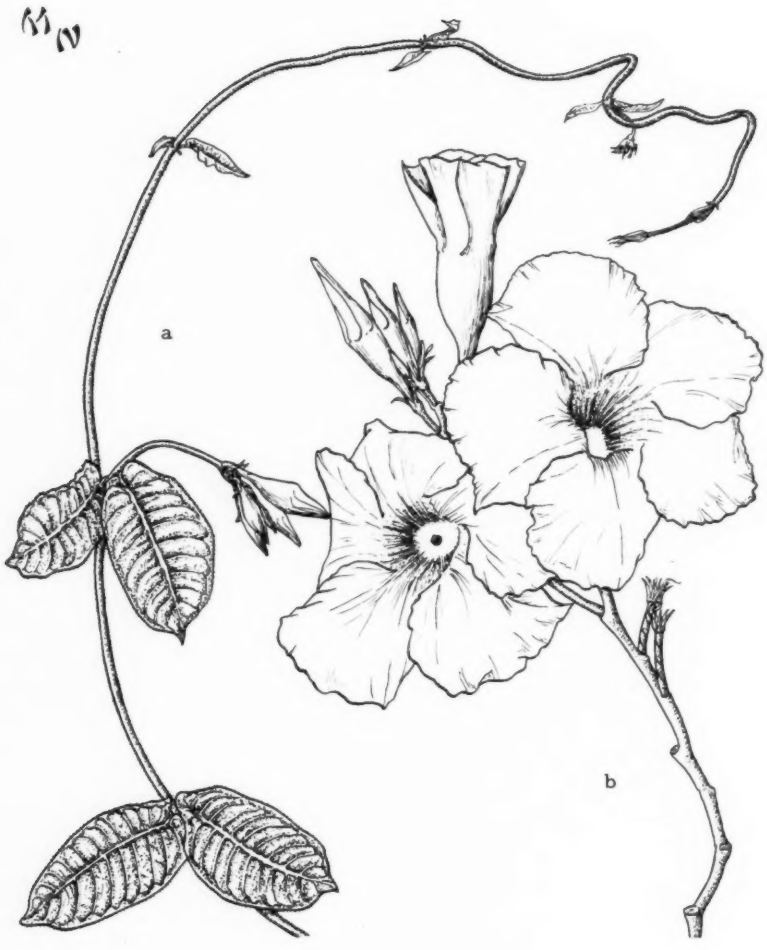


Fig. 33. Mandevilla splendens, as grown at Longwood Gardens: a, terminal portion of stem x 2/5; b, inflorescence x 3/5.

The species is a woody climber which at Longwood Gardens is trained on wire domes and is severely pruned each winter, so that its ultimate size cannot be judged from this collection, but it could undoubtedly produce branches at least 8 or 10 meters long. Its opposite, dark green, rugose, lustrous leaves are oblong-elliptic, 8–20 cm. long by 5.5–10 cm. broad. The racemose inflorescences are produced from alternate leaf axils. Each bears up to 20 flowers, of which one to four are open at a time. When each funnel-shaped flower first opens it is about 6 cm. in diameter and is Dawn Pink (RHS Horticultural Colour Chart 523/3) with a flush of Rose Madder (23/3) and a darker (23/1) throat. During the 3 or 4 days that a flower lasts, it expands and darkens, reaching a diameter of 10 cm. and becoming a dark Rose Madder (23/1).

A plant bearing numerous inflorescences is a striking sight, and its long flowering season, from April through November, makes it a very desirable greenhouse plant. The fruits which are occasionally produced consist of two slender follicles about 2-5 cm. long and 1 cm. in diameter.

In the fall of 1955, the plants at Longwood Gardens were believed to be the only ones in the United States. Since then, rooted cuttings have been distributed to other institutions and to one Florida nursery. It is expected that stock will become available to the public in the near future.

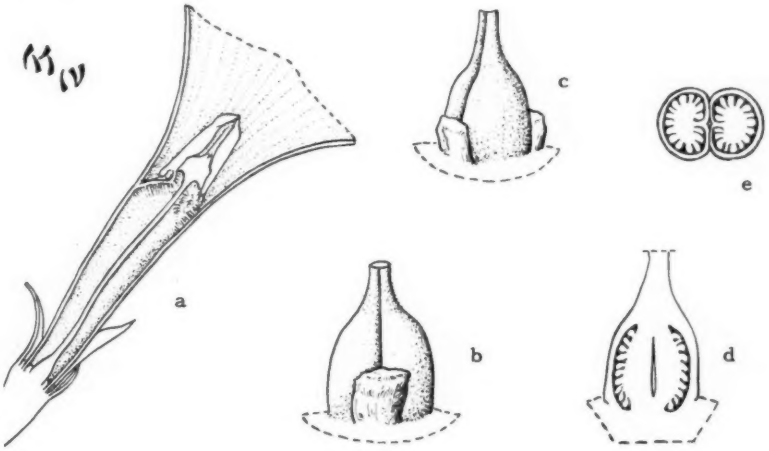


Fig. 34. Mandevilla splendens: a, vertical section of flower (with corolla-limb removed) x 2; b, c, two views of exterior of ovary and glands x 8; d, vertical section of ovary x 8; e, cross-section of ovary x 8.

Notes on Cultivated Scrophulariaceæ
3. Linaria

Gordon P. DeWolf, Jr.

The genus Linaria, as a concept, probably originated in the "Institutiones Rei Herbariæ" of Joseph Pitton Tournefort (first edition, 1700). Tournefort was born in 1656 and died in 1708. His parents wished him to take up a theological career, but on the death of his father in 1677 he turned to medicine. He took his medical degree at Montpelier, one of the early centers of botanical study. In 1883 he received an appointment to a post in the Jardin du Roy (later Jardin des Plantes). In subsequent years he travelled widely, his last trip a two-years journey to the Near East ending in 1702, for the purpose of acquiring plants for the royal garden. At the same time, he managed to write a textbook of botany and a medical flora of the region around Paris, as well as the "Institutiones." Tournefort's fame rests on the three solid quarto volumes of his "Institutiones." His was a synthetic type of mind, and where most of his predecessors and contemporaries could find differences, he was able to see resemblances. It is to him, essentially, that we owe the formal concept of genus - a group of species with a similar appearance. In the "Institutiones" he developed the ideas of certain earlier botanists and, for the first time, provided strict definitions of all of the genera of flowering plants known to him. Each genus was provided with, besides a definition, a list of accepted specific names and their synonyms. Tournefort based his definitions primarily on the morphology of flower and fruit. Finally, probably because he realized the weaknesses of verbal descriptions, two of the three volumes consist entirely of a series of analytical drawings of the reproductive organs to illustrate his generic diagnoses.

In 1735 there appeared the first of a long series of books by a young Swedish medical man named Linné which were to revolutionize the science of botany. Linné (better known as Linnæus) advocated two innovations which were badly needed in his time. The first was the concept of binomial nomenclature. Before his time, a plant name generally consisted of a generic name plus a descriptive phrase which might consist of one word but usually consisted of several. This phrase frequently changed from author to author.

Linnæus accepted the idea of the genus, and retained the generic name (which corresponds to the family name in human society). He also retained the polynomial specific name, and set up a series of rules for constructing it. This, in the course of time, has come to be what we call a circumscription - a description of the species. And, finally, he added a third concept, the trivial name, which was to be a single word, printed in the margin opposite the specific name proper, and was to be used as a brief way of refering to a particular species. For example, Linnæus recognized a group of plants which he called Antirrhinum. One of these was named Antirrhinum foliis quaternis lineari-lanceolatis. It might be conveniently refered to, however, as Antirrhinum purpureum. It is what we now call Linaria purpurea.

The second of Linnæus' innovations was his systematic arrangement of genera. Tournefort had grouped his plants into "Classes" of more or less similar genera. Contemporary botanists generally thought that Tournefort was correct and that similar things ought to be grouped together. Linnæus, however, apparently realized that such similarity is a concept which varies from person to person and that the only way to make things definite and unmistakable is to use characters that can be counted or measured. So, Linnæus set up twenty-four "Classes" based on the various combinations of numbers of floral parts. Thus Antirrhinum purpureum was placed in Class fourteen, "Didynamia", plants with four stamens of two different lengths, and a single pistil.

Linnæus' innovations were not completely pleasing to many of his contemporaries. Most of them, it seems, could stomach his system of classification, for by its use one could, by simply counting floral parts, quite readily find the name of any given plant. This simplicity appealed to an age which had suddenly expanded its frontiers and was faced with the necessity of inventorying a whole new world of unfamiliar things. His contemporaries were, however, much opposed to his nomenclatural alterations. He had no hesitation about coining a new species name if he thought the old one inappropriate (and everybody hates to learn a new name), and the idea of a "trivial" name was new and unpleasant also. Linnæus won his point, however, by the sheer bulk of his literary productions. His so-called "Sexual System" was fairly quickly accepted, and by 1775 all students of any consequence had adopted his idea of the "trivial" name.

In forming his own generic concepts, Linnæus relied rather heavily on earlier authors, of whom Tournefort was certainly one of the most important. His reliance was not slavish by any means and he had no qualms about lumping several genera together if it suited him. Tournefort had exerted a strong influence on his contemporaries and on the succeeding generation. His careful citation of synonymy was appreciated, his generic concepts were obvious,

and a number of prominent authors did not see any need for following the new and questionable practices of the young Swede. In any event, an appreciable number of books were published after 1753 (the year of publication of the "Species Plantarum," from which we date modern botanical nomenclature) which did not include the "trivial" name. Not only that, but Tournefort's genera, not Linnæus', were followed.

These publications which do not follow the Linnæan system have caused a good deal of concern amongst botanists. In solemn congresses, assembled modern nomenclaturists have rejected the stray binary names that appear in such books, but no definite action has ever been taken in the matter of generic names. By default, generic names may be taken up from books published subsequent to 1753 but not using binomial nomenclature, if those names were legitimately and validly published.

Many generic names have been taken from "Sir" John Hill's "The British Herbal" of 1756. This is a folio work which describes many plants which were native, or were grown, in Britain. Hill, in matters of classification, was a follower of Tournefort. Many Tournefortian generic names are found in Hill's herbal, and it has been assumed that this was the first publication of them subsequent to 1753. At least two other works, however, have been overlooked and in some cases the ascription of generic names belongs not to Hill but to either Philip Miller or Christoph Jacob Trew.

Philip Miller, Gardener to the Worshipful Company of Apothecaries, at their Botanic Garden at Chelsea, was born in 1691 and died in 1771. His "The Gardener's Dictionary," which ran through eight editions in his life-time, was perhaps the first really well known and popular dictionary of gardening in the English language. Miller, also, was a disciple of Tournefort, and it was not until the eighth edition (published in 1768) that he finally adopted Linnæan nomenclature. In the meantime, in 1754, he had published an abridged reprint of the sixth edition of the "Dictionary." In this, while binomial nomenclature is not used, circumscriptions of the genera are provided. This constitutes valid and legitimate publication, so that it is here that we find many Tournefortian generic names first published subsequent to Linnæus' "Species Plantarum."

Christoph Jacob Trew was a physician of Nuremberg who was interested in plants and books. He was affluent enough to indulge his hobbies and did so by publishing a number of sumptuously illustrated books dealing with plants. One of these was the "Herbarium Blackwellianum," which appeared in six volumes between 1750 and 1773. The second volume was published in 1754. This also follows the Tournefortian taxonomy and nomenclature. Besides a description of the plant figured on each plate, Trew also gives a fairly complete synonymy of both the generic and specific name. This also constitutes valid and legitimate publication according to the Code of Nomenclature.

It happens that both Miller and Trew used the generic name Linaria. Unfortunately, we do not know which work was published first. Both works are relatively uncommon. Under normal circumstances, I should be inclined to accept Trew over Miller, not only because he provides a good illustration, but also because he provides an excellent synonymy. However, the late Francis W. Pennell, an outstanding student of this group, has already selected Miller. Therefore, wherever author citation is used, the generic name Linaria should be ascribed to Miller.

In 1833 Edouard Chavannes published a "Monographie des Antirrhinées," which included the genera Antirrhinum and Linaria, as well as certain other segregate genera. This codified the various generic proposals that had been made up to that time, gave excellent synonymy for each taxon, provided an extended description, and gave detailed notes on distribution. This has been the basis for all subsequent study.

George Bentham wrote the treatment of Linaria which was published in the tenth volume of De Candolle's "Prodromus" published in 1849. This was little more than a condensed version of Chavannes' monograph, with new species intercalated. Subsequent to this, there has been no new monographic treatment of the group. As a result, there are a number of names in common usage which are of questionable validity. Likewise, the taxonomic limits of many species are not firmly drawn. Until such time as a definitive monograph appears, studies such as this, of limited scope, can give only limited help.

Many of us, I am afraid, condemn the genus Linaria on the basis of our acquaintance with a single species, L. vulgaris. This is certainly detrimental to our gardens and probably unfair to "Butter and Eggs." This is, as a matter of fact, a good example of a weed being but a flower out of place. Toad-flax or Butter and Eggs, as Linaria vulgaris is commonly called, was early, and probably accidently, introduced into this country. It has long been damned as a pernicious weed, but its gay yellow flowers in midsummer are not unattractive. As a matter of fact, it is a variable species, and quite possibly would be most responsive if taken in hand.

Occasionally plants of this species (or of others) are found with one or more flowers "deformed." The normal flower of Linaria vulgaris is strongly zygomorphic (bilaterally symmetrical) but in "deformed" flowers, which in this case are called peloric, the flower generally becomes actinomorphic (radially symmetrical) with five spurs (or the flower may be only partially deformed). This is a heritable condition, and careful breeding has produced a race in which all the flowers are peloric. This peloric condition was studied by Linnæus, and a thesis on the subject was defended by one of his students as early as 1744.

The genus Linaria is made up of approximately 75 species which, while widely distributed in the North Temperate Zone, are most strongly represented in Europe and around the Mediterranean. Annual species are particularly common in North Africa and the Iberian Peninsula. Many of the species, of course, have little ornamental value. Others, both annual and perennial, have unfortunate weedy tendencies. An appreciable number, however, are of horticultural value.

As garden subjects, the Linarias are quite useful. All, apparently, will bloom the first year from seed. Information concerning the duration of many of the species is lacking - or conflicting. I suspect that a number of perennial species are regarded as annual due to their lack of hardiness. Probably, also, most of the avowedly perennial species will prove to be short-lived in the northern part of the United States. While they come quite readily from seed, at least some of the species are reported to be self-sterile. They are reported to hybridize readily. It is probably wise, therefore, to take cuttings in late summer and carry at least some of the resultant plants through the winter in a cold frame or cold greenhouse.

The taller-growing sorts - varying in height from 60 to 120 cm. - are fortunately rather large-flowered. These are well suited for the back of the herbaceous border. Their blooming time - July and August, their bright or striking coloration, and their almost bizarre floral structure combine to make them particularly desirable. Some of the lower-growing sorts, 30 to 60 cm. high, are well suited to the front of the border. Many of these are small-flowered, but a few of the annuals have medium-sized flowers and particularly bright coloration. Finally, there are a number of species of decumbent habit which are suited to the rock or alpine garden.

Yellow seems to be a common color in the genus and, probably because of our familiarity with Linaria vulgaris, the one we generally think of, but various shades and stripings of blue, purple, or white are common. Again, while many species have relatively small flowers, in which the combined corolla and spur length totals less than 2.5 cm., some species have flowers which measure up to 5 cm. in length. Specific characters in this genus are found in the relative length of the pedicel as compared with the corolla; the relative length of the corolla-tube proper and spur; the cutting of the upper and lower lips of the corolla; color of the corolla; and habit of the plant. The genus itself may be divided into sections based on plant habit and the structure of the seed.

In 1935 the Academy of Natural Sciences of Philadelphia published "The Scrophulariaceæ of Eastern Temperate North America" by the late Francis W. Pennell. In this volume Pennell recorded the results of more than twenty-five years of study of this one plant family. His conclusions regarding the distinctions among the gen-

era of this alliance, as represented in North America, are perhaps best demonstrated by reproducing here part of the key he constructed to separate the genera. Since we are not concerned with all of the genera he recognized, I have abbreviated the key to some extent.

1. Capsule symmetrical, globose or cylindric, glabrous, thin-walled, the cells opening nearly or quite their entire length.
   2. Seeds angled or with thin wings; capsule dehiscing by irregular distal ruptures; corolla spurred, yellow or blue-violet, with or without a palate, the posterior lobes arched; anthers glabrous, all distinct; flowers generally in definite terminal racemes, the pedicels short; leaf-blades narrow, sessile; stems erect or repent. . . Linaria
   2. Seeds with several thick corky wings; corolla violet-blue or lavender, its orifice generally closed by a yellow palate; leaf-blades palmately veined and lobed; stems climbing or extensively trailing.
      3. Corolla saccate at the base; sepals longer than the irregularly rupturing capsule; stem generally twining. . . . .Maurandya [=Asarina]
      3. Corolla with a short spur at the base; sepals shorter than the capsule, which first ruptures distally; stems twining or trailing. . . . . .Cymbalaria
1. Capsule asymmetrical, the base of the slightly larger anterior cell wholly in front of the pedicel, both cells pubescent especially distally and both dehiscing by narrow distal openings.
   4. Corolla merely saccate at the base, its orifice closed by the conspicuous palate; capsule woody, hairy, decurved at the apex, the anterior cell opening by two definite pores, the posterior by a single pore; seeds irregularly ridged or cyathiform [sickle-shaped]. . . . . .Antirrhinum
   4. Corolla spurred at the base, the orifice open by the arching of the posterior lip above the palate; capsule membranous, finely pubescent, straight throughout, each cell opening by a single terminal pore; seeds with thin parallel wing-like ridges. . . . . .Chænorrhinum

Linaria triornithophora (Linnæus) Willdenow is a species seldom seen in American gardens. It is native in Portugal and has the reputation, probably deserved, of being intolerant of cold, wet weather. It was in cultivation in the Botanical Garden at Leiden in the decade before 1700. Both the "R. H. S. Dictionary" and the 1917 "New" edition of Johnson's "Gardeners' Dictionary" claim that it was in cultivation in England in 1710, though I do not know the basis for this statement. So far as I know, the first authentic reference is found in a catalogue of the plants in Dr. Fothergill's Garden in Upton in 1779. William Curtis illustrated the species in the "Botanical Magazine" for 1799, plate 525, as Antirrhinum triornithophorum. According to Reginald Farrer, in his "The English Rock Garden," the species grows to be 4-5 in. (10-13 cm.) tall. The plants in the Hortorium garden, growing from seed sown this spring, are already 3 ft. (1 meter) tall, and it was said to have grown to be as tall as a man in the Botanic Garden at Leiden.

Fig. 35. A, Linaria triornithophora: a, inflorescence x 2/5; b, single flower x 1. B, Linaria purpurea: a, flowering branch x 1/4; b, single flower x 2 2/5.

Linaria triornithophora is an erect glabrous and glaucous plant, with the broadly lanceolate leaves borne in whorls of three or four along the stem. The flowers, likewise, are borne in whorls of three, and generally only a few whorls are open at a time. Since, however, each plant produces several stems simultaneously, and all of the stems normally bear flowers, a single plant will make quite a respectable show. This is, without doubt, one of the most showy species of Linaria. In areas where it is hardy, probably as far north as Philadelphia, and possibly even farther, it would have much value as a denizen of the perennial border, since it blooms from early July until frost. The flowers are large, nearly 5 cm. in length. The base color is a pale lavender, heavily striped with dark lavender or lavender-purple, with a yellow palate. The spur is stout, about as long as the corolla-tube. The pedicel at flowering time is also about as long as the corolla-tube. The epithet triornithophora (3-bird-bearing) is in reference to the fact that three flowers are borne at each node and that each flower may be fancifully likened to a little bird!

Three Moroccan species may be mentioned next. They are all annuals - or at least so treated in gardens. The oldest of these, in point of our knowledge of them, is Linaria reticulata (J. E. Smith) Desfontaines. This was first described and illustrated by Sir James Edward Smith (the purchaser of Linnæus' herbarium and one of the founders of the Linnæan Society of London) in 1790. Smith, following Linnæus' criteria, called it an Antirrhinum. In 1798 Réné Louiche Desfontaines, Professor in the Jardin des Plantes in Paris, began publication of a 2 (or 4) volume work entitled "Flora Atlantica, sive Historia Plantarum, quae in Atlante, agro Tunetano et Algeriensi crescunt" (Flora of the Atlas region [northwest Africa] or a history of the plants which grow in the Atlas, in the territory of Tunisia and Algeria). In this work Desfontaines accepted the segregate genus Linaria and transferred Smith's species to it. In nature the species is distributed on the coast of North Africa and in Portugal as far north as Oporto.

Linaria reticulata is an erect, glaucous species, growing to perhaps 60 cm. tall, with narrowly linear leaves. The spur is as long as the corolla-tube, narrow and sharp-pointed, straight or slightly incurved. The corolla is purple with deeper purple lines, and longer than the pedicel.

Linaria bipartita (Ventenat) Willdenow is next. This species is native in Morocco and Mauritania. It was first described as a species of Antirrhinum by Etienne Pierre Ventenat, a librarian at the Bibliothèque du Panthéon in Paris, in a volume entitled "Description des plantes nouvelles et peu connues, cultivées dans le jardin de J. M. Cels." Ventenat was trained for an ecclesiastical career and took up botany, so we are told, after he reached the age of thirty. He was the author of 3 small-folio works illustrated by the famous botanical artist, Redouté. The work under notice here is

devoted to plants grown by Jacques Martin Cels, a nurseryman near Paris who was active in acquiring and growing exotic plants. Cels obtained seeds of this species from Pierre Marie Auguste Broussonet, Professor of Botany in Montpelier, who had collected plants in Morocco. In 1809 Karl Ludwig Willdenow, Professor of Botany at Berlin and author of the last edition of the "Species Plantarum," published an enumeration (with brief descriptions) of the plants in the Berlin botanic garden. In this work Antirrhinum and Linaria were separated, and the species under consideration was treated under Linaria.

Linaria bipartita is an erect, glabrous plant, with linear leaves, generally less than 30 cm. tall. The length of the flower, including corolla-tube and spur, ranges between 2 and 2.5 cm., and the incurved spur is as long as the corolla-tube. The flower is blue-violet, with an orange palate. The specific epithet was given with reference to the deep emargination which almost splits the upper lip of the corolla. This is not a unique condition in the genus, however, even though other examples were apparently unknown to Ventanat.

Finally, we have Linaria maroccana Hooker filius. This species, a native of Morocco, was not detected until 1871, when it was collected by Joseph Dalton Hooker (Hooker filius), then director of the Royal Botanic Garden, Kew. It is a slender, narrow-leaved, erect plant, 25-50 cm. tall. The corolla is bright purple with a clear yellow patch on the palate. This is reputed to be one parent of the hybrid annual linarias that are grown in this country today.

The next group of species which may be mentioned includes those with large yellow flowers. Two names in the trade (and in botanical works), Linaria dalmatica (Linnæus) Miller & L. macedonica Grisebach, seem to refer to the same species, a taxon widespread in the northern Levant. This has been introduced into cultivation at least twice and from different areas. There does not seem to be a great deal of difference between them, however, and it therefore seems unwise to retain the two names. The older of the two epithets is dalmatica, based on Antirrhinum dalmaticum of Linnæus (1753) which was effectively transferred to Linaria by Philip Miller in the 8th edition of his "Gardener's Dictionary" of 1768. The epithet macedonica dates from the "Spicilegium Floræ Rumelicæ et Bithynicæ, exhibens synopsin plantarum quas aest. 1839 legit auctor" (Notes on the Flora of Rumelica and Bithynia, including a synopsis of the plants which the author collected in the summer of 1839), written by August Heinrich Rudolf Grisebach, Professor of Botany at Gottingen and author (in 1864) of the "Flora of the British West Indian Islands."

This taxon is similar in general appearance to L. triornithophora, but the leaves are alternate, the flowers are borne singly, and the inflorescence is frequently paniculate. The flowers may be

as large as those of L. triornithophora, or they may be no more than 2 cm. long. This taxon also is a perennial.

Linaria ventricosa Cosson and Balansa was described from material collected in Morocco in May, 1867. It is described as similar to L. dalmatica, differing in the smaller, more inflated (ventricose) corolla-tube. It differs also in color, for the yellow corollas have a chocolate-brown veining.

Linaria vulgaris, the Butter and Eggs or Toadflax, belongs here. This is a widespread species ranging from western Asia to England, south to the Caucasus and the Mediterranean. The name L. italica Treviranus seems to refer to some form of L. vulgaris. Bentham records that he considered English material of L. italica to represent a hybrid between L. vulgaris and L. stricta.

Linaria tristis (Linnæus) Miller is the Dull- or Sad-colored Linaria. As currently interpreted, this is a species with a yellow corolla and a brown palate, native in southern Spain, North Africa, and the Canaries. Miller's description, however, is of a plant, seed of which he received from Gibraltar, with a yellow corolla striped with purple, and with the palate and spur dark purple. The correct names of these two taxa must wait for a careful study of the genus. In the meantime, it seems reasonable to follow customary usage in the application of the name.

The small-flowered species of Linaria, particularly the perennials, seem to be fairly uncommon in American gardens.

Linaria alpina (Linnæus) De Candolle is a species found widely through the mountains of central Europe and the Pyrennees. The plant is at least a short-lived perennial, with decumbent or almost creeping aerial stems which terminate in compressed racemes of vivid bluish-purple flowers. The whole plant forms a clump perhaps 30 cm. in diameter and 10 - 15 cm. tall. According to Hegi's "Illustrierte Flora von Mittel-Europa," this is a characteristic plant of the limestone mountains within its range - though it grows also in granitic rocks. Farrer says, on the contrary, that it is characteristic of the granitic and volcanic rocks and found hardly at all on the limestones. Whatever the case may be, this is a species which comes readily from seed (as all the linarias seem to do), blooming the first year. The flowers are freely produced, the brilliant bluish-purple and orange of the flowers being complemented by the grayish bloom on the leaves. Besides the rock garden, this would certainly be useful for the front of the herbaceous border.

Linaria purpurea (Linnæus) Miller is an erect perennial native in southern Italy and Greece. The stems may reach a meter in height. Near the apex, each stem branches freely and each branch may branch again. Ultimately, however, each branch is terminated by a raceme of centimeter-long, violet-purple flowers. Besides the normal erect flowering shoots, this species, in common with

some others, produces sterile basal branches, or suckers. These fill in the base of the plant with gray-green foliage and add materially to its compact appearance.

Linaria repens (Linnæus) Miller, contrary to what one might expect from the name, is an erect perennial with stems to 60 cm. tall. It is native in England and western Europe. The flowers are pale lilac or whitish, striped with purple, and have an orange palate.

Linaria anticaria is a name which is in the trade - though specimens which we have under this name are referable to other species. The true L. anticaria Boissier and Reuter is a perennial, sending up several ascending branches to as much as 30 cm. long, with elliptic-lanceolate leaves to 1 cm. long borne in whorls. The flowers are whitish as to ground-color, but striped and netted with bluish lavender, and have a dark brown callus with a yellow spot. This is a species from southern Spain. Unlike most of the other cultivated species, it flowers in late spring.

Linaria faucicola Levier and Leresche is a pretty little species from northern Spain. Though it was not described until 1879, it has gained a certain amount of popularity in England. Its stems are weak and ascending, and in aspect it would appear not to be too much different from L. alpina, though the leaves are elliptic-lanceolate in shape. The flowers, however, are somewhat different. The corollas are generally a luminous lavender-purple, but with a netting of white veins on the lower lip. The palate, also, is fringed with purple hairs, and two rows of orange hairs lead back into the throat. All in all, it seems that this is a plant which we should cultivate more frequently.

There are three species of Linaria native in the eastern United States. Of these, one, L. floridana Chapman, is restricted almost entirely to Florida. Linaria texana is somewhat more widely distributed in Texas and adjacent areas and on the West Coast, and L. canadensis is widespread on the coastal plain from New England to the Mississippi River. The name Linaria canadensis (Linnæus) Dumont is in the trade - this refering to a plant with rather insignificant violet-blue corollas to 14 mm. long. Linaria texana Scheele is similar, but the paler corollas may get to be 2 cm. long.

Finally, there are three species with small yellow flowers. Linaria supina (Linnæus) Desfontaines is, according to Sampson Clay, essentially a yellow Linaria alpina. Herbarium material that I have seen certainly confirms this. Clay considered it an especially fine plant for the rock garden. It is native principally in the mountains of southern Europe, where it runs to a multitude of forms. Linaria saxatilis (Linnæus) Hoffmansegg and Link is a viscid-pubescent perennial with ascending stems which may be 10-15 cm. long. Linaria Broussonetii (Poiret) Chavannes from Morocco and the southern part of Spain is last. It is an ascending annual with bright yellow flowers, with the palate orange, spotted brown.

Key to the Cultivated Species of Linaria

1. Flowers 2.5 cm. or more long (measured from the apex of the upper lip to the tip of the spur).
   2. Color of flowers predominantly blue, purple, or violet.
      3. Leaves lanceolate, to 7.5 cm. long, 2 - 2 1/2 times longer than broad, borne usually in whorls of 4, glabrous and generally glaucous; plant to 120 cm. tall. . . . . L. triornithophora
      3. Leaves linear or linear-lanceolate, to 7.5 cm. long, about 5 times longer than broad.
         4. Upper lip of the corolla not lobed; plant 60 - 90 cm. tall, glabrous except for the inflorescence; leaves 4 - 6 in a whorl. . . . . L. reticulata
         4. Upper lip of the corolla bifid.
            5. Plant about 30 cm. tall, glabrous. . . . . L. bipartita
            5. Plant 25 - 45 cm. tall, glabrous except for the viscid-pubescent inflorescence. . . . . L. maroccana
   2. Color of flowers predominantly yellow.
      6. Leaves broadly to narrowly lanceolate, sessile, to 7.5 cm. long, 2 - 3 times longer than broad, alternate, glabrous and glaucous; plant to 90 cm. tall.
         7. Corollas clear yellow. . . . . L. dalmatica
         7. Corollas yellow, with brownish veins. . . . . L. ventricosa
      6. Leaves linear or linear-lanceolate, 2.5 cm. long or longer.
         8. The leaves 4 - 5 times longer than broad; stems decumbent; corolla-tube and spur yellow, lips brownish. . . . . L. tristis
         8. The leaves 6 or more times longer than broad; stems erect; flowers pale yellow with the palate richer yellow. . . . . L. vulgaris

1. Flowers less than 2.5 cm. long.
   9. Color of flowers predominantly blue, purple, or violet.
      10. Stems more or less decumbent or prostrate.
         11. Leaves linear-oblong, glaucous; flowers rich blue-purple, palate orange, glabrous. . . . . L. alpina
         11. Leaves lanceolate; flowers rich rosy-purple, striped darker, with two lines of orange hairs in the throat. . . . . L. faucicola
      10. Stems erect or ascending.
         12. Stems conspicuously leafy, at least to the base of the inflorescence.
            13. Flowers pale lavender or whitish. . . . . L. repens
            13. Flowers deep rich blue-purple; plant glabrous and glaucous. . . . . L. purpurea
         12. Stems with only a few more or less appressed leaves, though having a number of basal slender leafy branches 2.5 - 5 cm. long; flowers pale lavender. . . . . L. canadensis

9. Color of flowers yellow.

14. Stems more or less decumbent, pubescent; flowers nearly 2.5 cm. long. . . . . L. supina

14. Stems ascending, viscid-pubescent.

15. Leaves 13 - 17 mm. long; inflorescence many-flowered; spur of corolla slightly incurved, shorter than the tube. . . . . L. saxatilis

15. Leaves 7 - 13 mm. long; inflorescence 2 - 3 flowered; spur of the corolla straight, longer than the corolla-tube. . . . L. Broussonetii

Name Changes and New Species of Western American Lilies

Lily enthusiasts will be interested in a recent paper on West Coast lilies[1] in which Lawrence Beane, of Fresno, California, has published names and descriptions of two new species, elevated two varieties to specific rank, and transferred Lilium Humboldtii var. Bloomerianum to subspecific status under Lilium ocellatum.

Beane's paper makes it clear that his findings are based not only on field studies of the plants, but are confirmed by cytological data derived from chromosome studies. The two new species, described jointly by Beane and Dr. Vollmer (a student of West Coast lilies, with years of experience), are:

Lilium Wigginsii (Named for Dr. Ira L. Wiggins, a California botanist). This is allied to L. Vollmeri Eastwood, and occurs in northern California and southern Oregon. It may have been introduced to the trade as L. Roezlii, a name which is really a synonym

1 Beane, Lawrence, "Some undescribed lilies from the Pacific Coast and a preliminary revision of the southern Californian species formerly associated with Lilium Humboldtii." Contributions from the Dudley Herbarium 4: 355-360, pls. 18-22, (Dec.) 1955.

of L. pardalinum. It is a small-flowered Turkscap lily with a rhizomatous bulb, and is said to differ from L. Vollmeri (with which it is reported to hybridize in the wild) by the perianth-segments being clear yellow and spotted with purple, and by the yellow anthers.

Lilium pitkinense (named for Pitkin Marsh, in Sonoma Co., Calif.). This is described as having "a counterpart in L. Wardii Stearn, an Asiatic species of Tibet which has pale or deep rose-pink flowers and is stem rooting and bears stolons. L. pitkinense is not stem rooting." It is reported to produce stolons, a character not found in other West Coast species. The reflexed perianth-segments are described as "scarlet-vermilion from the tip to the middle with a well-defined zone of yellow extending to the base, spotted with small blackish spots mostly confined to the yellow zone (as the flower ages, it becomes entirely crimson)..."

Lilium Harrisianum Beane and Vollmer is a new name for the plant previously known as Lilium pardalinum var. giganteum Stearn and Woodcock. It is known as the Sunset lily, Red Giant, or Chinook lily. It is named for Mr. Lee Harris, who first observed it along the Van Duzen River, northern California, in 1890. It is reported to have a marked karyotype (chromosomal complex type) which differentiates it from that of L. pardalinum. The authors present evidence refuting an earlier view that it might be a hybrid between L. Humboldtii and L. pardalinum.

Lilium shastense (Eastwood) Beane is a new name for the lily named by the late Miss Alice Eastwood, Lilium nevadense var. shastense. Beane expressed the opinion, "after studying this distinct little lily for several years," that there is adequate morphological basis for elevating this plant to species rank, and that it may be more closely related to L. Harrisianum than to other members of the nevadense group.

In this paper, Beane also has considered Lilium Fairchildii M. E. Jones to be a distinct species and not synonymous with L. ocellatum. He has redescribed it, and provided a diagnostic plate illustrating its bulb and floral features.

G. H. M. L.

A Review of the Genus Eucryphia

William J. Dress

Eucryphia is a small genus of trees and shrubs of great beauty and refinement, but of unmerited rarity in cultivation in this country. It is true that they are not for every garden, since their requirements include a mild climate and acid soil, but even on the Pacific Coast, where some fine specimens attest to the suitability of conditions, the eucryphias are little known. It is doubtful that any of them have ever been tested to any extent in the Southeast, but their merits surely warrant some experimentation with them in that area.

The genus Eucryphia was founded in 1797 by Antonio José Cavanilles, in his "Icones et descriptiones plantarum ...." (Vol. 4, p. 48), on the basis of herbarium material he had of the Chilean species, E. cordifolia, also therein described for the first time. Cavanilles derived the name from the Greek "eu" and "kryphia"; its meaning is "well-covered" or "well-hidden," in reference chiefly to the sepals which, cohering at their apices but detaching at their bases, come off like a cap to reveal the corolla-bud underneath.

Since its founding, botanists have referred this genus to one or another plant family, according to the importance they have attached to various morphological, anatomical, or distributional characteristics of its members. At times, therefore, Eucryphia has been lodged among the Saxifragaceæ, Cunoniaceæ, Rosaceæ, Hypericaceæ, or even other families. Most taxonomists of the past half-century, however, have treated the genus as representing a separate and distinct family, but, even so, they have not agreed upon its relationship with other families. The most recent monographer of the group, J. Bausch ("A Revision of the Eucryphiaceæ." Bulletin of Miscellaneous Information, Royal Botanic Gardens, Kew [1938], 317-349.), has joined those who have considered it related most closely to the Cunoniaceæ, which, in turn, is allied to the Saxifragaceæ.

The eucryphias are by nature evergreen, though under cultivation in colder climates E. glutinosa may be partially or quite deciduous. In this country and in Great Britain they are usually

shrubs or small trees, but two or three are capable of reaching great heights in their native lands. The branchlets and leaves are opposite, the latter being stipulate, coriaceous, and either simple or pinnately compound. The white flowers are borne singly in the axils of the leaves, have usually four petals and numerous stamens, and bear a superficial resemblance in form to the flowers of the hypericums. The fruit is a capsule which splits at maturity into a varying number of separate valves, each valve with a few oblong, winged seeds.

Species of Eucryphia are found on both sides of the South Pacific Ocean, sharing with some other plant and animal groups a peculiar geographical distribution that has by some people been considered evidence of a former "land bridge," either continuous or interrupted, between South America and Australia. All the species, as well as several forms and hybrids, are in cultivation at present in the British Isles; most of these are now or have recently been available in the trade in this country also. Although Bausch's revision of the genus in 1938 set its nomenclature straight, some nurserymen and horticultural writers, both here and abroad, are still employing for plants of this genus names which should now be discarded.

The following key, which is based, in part, on that of Bausch, may be used to distinguish the species, as well as the hybrids produced to date.

1. All leaves simple.
   2. Leaves crenate-dentate to dentate-serrate, and pubescent beneath, at least on the veins; ovary glabrous. . . . . .E. cordifolia
   2. Leaves entire, glabrous and glaucous beneath; ovary pubescent.
      3. Small bracts at base of flower-pedicel 2; lvs. [2.7-] 3.5-5.4 cm. long, 3 or more times longer than broad. . . . . .E. lucida
      3. Small bracts at base of flower-pedicel 3-5; lvs. mostly much less than 2.6 cm. long, less than 3 times as long as broad.
         4. Bracts 4 [-5]; lvs. 0.7-1.4 cm. long, usually not more than twice as long as broad. . . . . E. Milliganii
         4. Bracts usually 3; lvs. 0.7-2.6 cm. long, between 2 and 3 times as long as broad. . . . . E. × hybrida
1. All or some of leaves pinnately or ternately compound.
   5. Leaves all compound, the lfts. usually 5 or more.
      6. Leaflets crenate-serrate. . . . . .E. glutinosa
      6. Leaflets entire.
         7. Lateral lfts. narrowly oblong, 5 or more times as long as wide, in 1-7 but mostly 2-5 pairs. . . . . .E. Moorei
         7. Lateral lfts. oblong-elliptic, 3 or less times as long as wide, in 1-4 but mostly 2 [-4] pairs. . . . . E. × Hillieri

5. Leaves simple and compound on the same plant, the compound lvs. with usually 3 lfts.

8. Leaflets or simple lvs. conspicuously serrate along whole margin. . . . . E. × nymansensis

8. Leaflets or simple lvs. nearly entire or somewhat serrate above the middle. . . . . E. × intermedia

Eucryphia cordifolia, as has been mentioned, is the type-species for the genus, for it was the first species known to science, named and described by Cavanilles in 1797. Tallest of the genus, plants of this species may reach 40 m. in height. The leaves are simple, ovate-oblong, cordate to rounded basally, dull dark green above, grayish-tan and somewhat pubescent below. Those on young plants tend to be sharply serrate, but on older plants the teeth are blunted and less conspicuous. The flowers are about 5 cm. across and are usually 4-petaled, though flowers with 5 or 6 petals are often produced, as is indicated by a drawing of this species in the "Gardeners' Chronicle" of Sept. 29, 1917, and by a photograph in the Sept. 3, 1955, issue. This proclivity no doubt accounts for the characterization "corollæ petala quinque" (petals of the corolla five) in Cavanilles' generic description, and for his depiction of a 5-petalous and a 6-petalous flower in the plate (tab. 372) illustrating E. cordifolia. Coming from the rain-forests of southern Chile, it is one of the most tender of the eucryphias.

The second species to be discovered was first described by La Billardière ("Relation du voyage à la recherche de la Pérouse..." 2: 16)[1] who had come upon it at the end of January, 1793, in the forests of New Holland, present Tasmania. For this plant he set up the new genus Carpodontos, giving to the species itself the name Carpodontos lucida. By this name it was known until Edouard Spach's study of Carpodontos and Cavanilles' Eucryphia ("Histoire naturelle des végétaux. Phanérogames" 5: 345-346 [1836]) led him to conclude that the two genera should be united, since their essential characters were, in his opinion, absolutely the same. On transferring La Billardière's species to Cavanilles' genus Eucryphia, however, Spach chose to honor its discoverer by giving it the new specific epithet Billardieri rather than retain its original epithet, lucida. Thereafter, with few exceptions, botanists and horticulturists referred to the Tasmanian eucryphia as E. Billardieri, right up to the time (1938) that Bausch's monograph appeared.

Actually, Baillon had in 1869 made the combination Eucryphia lucida in his "Histoire naturelle des plantes" 1: 402, returning to Cavanilles' name for the specific epithet, and placing Spach's E. Billardieri in synonymy; but only a few later authors either knew of or chose to use Baillon's combination, which is the correct or

[1] Bausch gives 1798 as the publication-date of this work, but it apparently actually came out in late 1799 or 1800 (cf. "Flora Malesiana" Series I, 4: clxxi [1954]).

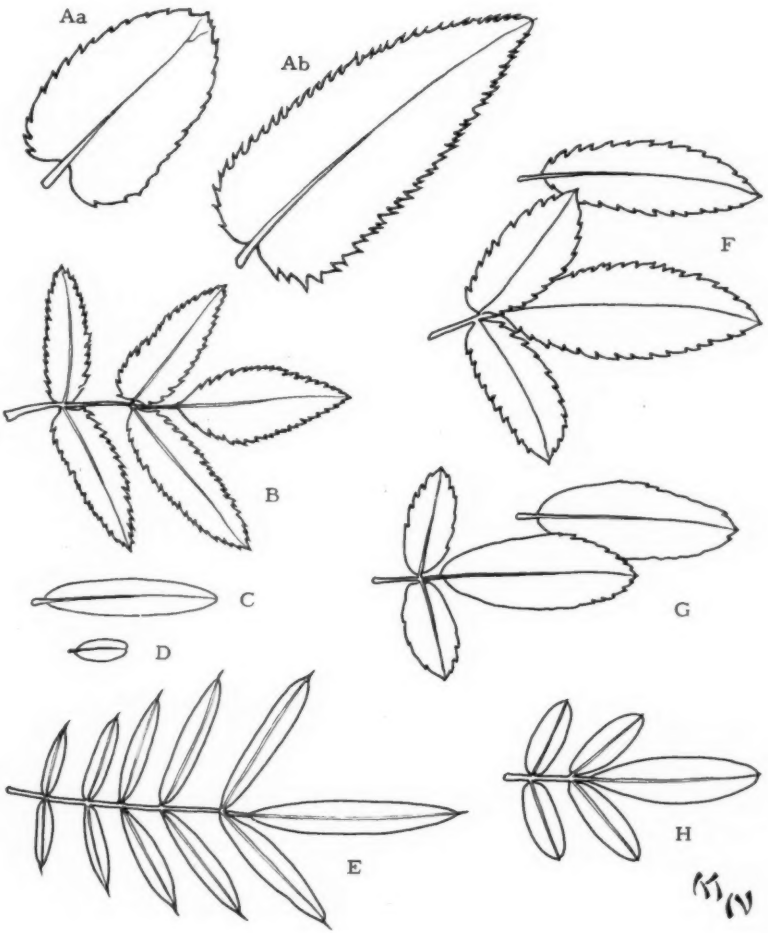


Fig. 36. Leaves characteristic of Eucryphia species and hybrids, all x 1/2: A, E. cordifolia: a, from mature plant; b, from juvenile plant. B, E. glutinosa. C, E. lucida. D, E. Milliganii. E, E. Moorei. F, E. x nymansensis, simple and compound leaves. G, E. x intermedia, simple and compound leaves. H, E. x Hillieri.

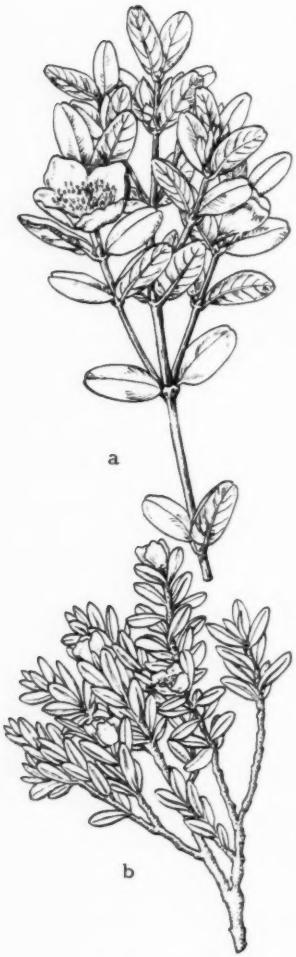


Fig. 37. Eucryphia Milliganii: a, lowland form; b, mountain form. Redrawn from Flora Tasmaniæ, plate VIII.

valid name according to the present code of nomenclature. Even the "Index Kewensis" did not list Baillon's name until its Supplement IX for 1931-1935, although it had previously (Supplement VI for 1916-1920) published the same combination when it was made by George Druce in 1917 ("Report of the Botanical Exchange Club of the British Isles for 1916" 4, Suppl. 2: 622 [1917]). Druce, unaware of Baillon's previous publication of E. lucida, had independently recognized the need for this combination to satisfy those rules of nomenclature in effect then, as now, demanding the use of the earliest legitimate epithet when a species is transferred from one genus to another.

Eucryphia lucida, like E. cordifolia, may also in time grow to be a rather tall tree. The foliage is more refined, the leaves being simple and entire, oblong, shining green above, glaucous beneath. The flowers tend to be somewhat smaller than those of E. cordifolia.

Very closely allied to E. lucida is another Tasmanian plant which is sometimes found growing and even hybridizing with it in nature, though it tends to reach higher altitudes. Joseph Hooker considered this a distinct species and so described it in 1855 in his "Flora Tasmaniæ" 1: 54, under the name E. Milliganii. Dr. Joseph Milligan of Hobarton, an ardent collector, may have been its discoverer. This taxon resembles E. lucida, but is reduced in every respect, including plant-height (to 14 m.) and size of leaves and flowers. Since the morphological characters that separate these two taxa are relatively minor ones, and since the geographical range is similar (the two sometimes in association, with intermediates occurring), many authors have regarded Hooker's plant as a smaller and more alpine variety of the other, calling it then either E. Billardieri var. Milliganii or E. lu-

cida var. Milliganii. Hooker, himself, later followed Bentham in using the name E. Billardieri var. Milliganii when he wrote the comment for plate 7200 of "Curtis's Botanical Magazine" (vol. 47, 1891), which purported to illustrate that taxon. The plant depicted by plate 7200 appears actually to have been only typical E. lucida (E. Billardieri), however, and so Hooker's acceptance of varietal rank for his E. Milliganii may have been influenced by a misconception on his part. Bausch emphatically considered E. Milliganii to be a separate species, and since he has made a more thorough and comprehensive study of the group than has anyone else, and since I have, myself, seen no living or herbarium material of this taxon, I am following his treatment here, though I am not convinced that the criteria[1] he has used for distinguishing it from E. lucida warrant for it more than varietal rank under the latter species.

As has been mentioned, plants intermediate in character between E. lucida and E. Milliganii occur where the two grow associated, and have been described as natural hybrids between them and named E. × hybrida by Bausch. So far as is known, this "hybrid" is not in cultivation, even in Great Britain.

Of the two species with pinnately compound leaves, E. glutinosa is the better known in cultivation, having been introduced to England from Chile in 1859 by Richard Pearce, a collector for the nursery firm of James Veitch and Sons at Exeter. This was not too long after it was discovered, for in 1839 Poeppig and Endlicher described and figured it in volume 2 of their "Nova Genera ac Species Plantarum...," which was concerned with plants collected by Poeppig in Chile, Peru, and the Amazon region during 1827-1832. Poeppig's specimen of this species was a sterile one, however, having been collected in January, before the normal flowering season (March). It was erroneously thought to be a new species of beech and was named Fagus glutinosa by these two authors. A few years later, Claude Gay, having seen this plant growing wild along the Biobio river in the province of Concepcion, Chile, was able to recognize its relationship to the previously described Eucryphia cordifolia, and named it E. pinnatifolia, citing Fagus glutinosa as a synonym. This he did in his "Flora Chilena" 1: 352 (1846),[2] which comprised the botanical part of the "Historia Fisica y Politica de Chile."

[1] "...The number of bracts, in E. lucida 2, in E. Milliganii 4; differences in shape and size of the leaves, the apex and the base; size of flowers, length of the pedicel of the fruit in proportion to the fruit itself; further, the leaves are much more crowded in E. Milliganii than in E. lucida and the method of splitting of the epicarp and the endocarp in the valves of the capsules is different [but only in degree - W. J. D.]." (Bausch, op. cit., p. 330.)

[2] Bausch (op. cit., p. 322) erroneously gives 1854 as the date for the publication of this name (cf. "Flora Malesiana" Series I, 4: clxxxiv [1954]).

Fig. 38. Eucryphia glutinosa. Redrawn from Curtis's Botanical Magazine, vol. 115, plate 7067 (1889).

Even though Baillon in 1869 retrieved the specific epithet of Poeppig and Endlicher's Fagus glutinosa and transferred it to Eucryphia to make the new combination E. glutinosa (Baillon, loc. cit.), the name most commonly used in the horticultural literature was for a long time E. pinnatifolia. The present code of nomenclature, giving priority to the oldest epithet used for the plant, requires that E. glutinosa be considered the valid name, of course.

Attaining only a maximum of 10 m. even in the wild, E. glutinosa is the most modest in stature of the eucryphias. The leaves are odd-pinnate, with usually 5, sometimes 3, elliptic dark green leaflets with serrated margins, the surfaces pubescent, at least when young. This species may be deciduous under cultivation in some regions, and, when so, the foliage assumes orange, red, and purple coloring before falling. Its flowers are the largest in the genus.

This species, like E. cordifolia, has a tendency to produce flowers with 5 or more petals. Semi-double- or double-flowered plants may occasionally occur among seedlings of the normal form, and a double-flowered cultivar, known as 'Plena', is sometimes obtainable in the trade. Remarks such as "should be avoided" and "not apparently of much value" have been applied by some British horticulturists to this form, but I have seen a plant of it in bloom at the United States Government Locks Park in Seattle, Washington, and considered it quite attractive. This particular shrub was raised by Mr. Carl S. English, Jr., from seed of the normal "single-flowered" type. 'Daisy Hill' is a cultivar with "semi-double flowers, with chocolate anthers amongst the extra petals," which apparently originated at the Daisy Hill Nursery, Newry, N. Ireland. Whether this differs appreciably or at all from 'Plena' I do not know.

About ten years ago, the same nursery also offered "a dwarf compact form" in which "plants 2 ft. high are as much or more across, and flower over the surface of the plant." Originally listed as E. pinnatifolia nana, this should now be called E. glutinosa 'Nana', if it still exists. The Slieve Donard Nursery Co., in Northern Ireland, has listed a cultivar 'Camelliæflora', describing it as "a seedling form of great merit. The pure white petals are reflexed and contrast beautifully with the dark crimson anthers."

Last of the species to be discovered, E. Moorei has had an untroubled nomenclatural and taxonomic history, for since it was so named and described by Ferdinand von Mueller ("Fragmenta Phytographiæ Australiæ" 4: 2 [1863-64]), it has been called nothing else. It was discovered by Charles Moore on wooded mountain slopes in New South Wales, and is confined to the southeast corner of the Australian continent.

In its homeland it reaches 25 m. or more at maturity, but away from its warm, humid, jungle-like forests it can be expected to be considerably less vigorous. The leaves are odd-pinnate,

Fig. 39. Eucryphia Moorei. Redrawn from Curtis's Botanical Magazine, vol. 158, plate 9411 (1935).

with up to 15 but usually 5-11 leaflets which in form are not much different from the individual leaves of E. lucida, except in being conspicuously mucronulate-apiculate at the apex. The flowers are attractive but relatively small for the genus (to 2.5 cm. across).

Eucryphia Moorei is still relatively rare in cultivation, having been introduced to the Royal Botanic Gardens at Kew only as late as 1915, according to Bean.

All the species have been involved in hybridization to some extent. Eucryphia × hybrida has already been mentioned as a natural hybrid between E. lucida and E. Milliganii. Other hybrids have arisen under cultivation, some of them accidental and even unverified, although the circumstantial evidence leaves little doubt as to their status or their parentage.

A hybrid between the two Chilean species, E. cordifolia and E. glutinosa, was the first to be recorded, and this has been given the collective name E. × nymansensis by Bausch. The original plants of this cross were grown from seed taken about 1915 from a plant of E. glutinosa which grew close to a plant of E. cordifolia, and were evidently the product of chance cross-pollinization. Lt. Col. Messel, in whose gardens at Nymans, Handcross, Essex, these plants were raised, at first purposed to designate the various seedlings as 'Nymans A', 'Nymans B', etc., but 'Nymans A' was changed to 'Nymansay' and it was as E. nymansay that a plant of this hybrid won an award of merit at an R. H. S. meeting in August, 1924. Since that time, much of the horticultural literature and most trade catalogues have called the hybrid form originating at Nymans E. Nymansay, E. nymansay, or even E. Nymansii, as though these were scientific names. 'Nymansay' should be treated as a cultivar name; as it occurs in the literature and trade today, it may not designate a clone but seems to be used for those hybrids of this group in which the female parent was E. glutinosa. That it does not represent a true clone derived from Col. Messel's original award-winning plant seems indicated by varying opinions on its merits, and by such remarks as, "This hybrid varies considerably. Some forms are very free-flowering, some sparse" ("Journal of the Royal Horticultural Society 80: 263 [1955]). The name E. × nymansensis, on the other hand, would apply to any plant arising at any time, and anywhere, from the hybridization of the two species, E. cordifolia and E. glutinosa.

Eucryphia × nymansensis cv. 'Nymansay' (which may correctly be shortened to Eucryphia 'Nymansay') apparently has all the good qualities of E. glutinosa and in addition is more vigorous and more erect, quite evergreen, tends to have even larger and more pleasingly formed flowers, is reportedly "indifferent to lime" in the soil, and is more easily propagated by cuttings. The leaves are intermediate in form between those of its parents, both simple and trifoliolate leaves being found on the same branches.

Another cultivar of E. × nymansensis is 'Mount Usher', having the same parentage as 'Nymansay' but being the result of the reverse cross - E. cordifolia having been the female parent. Some reports indicate that young plants come into bloom at an earlier age than do those of 'Nymansay', but otherwise it appears to differ little from the latter. As in 'Nymansay', both simple and trifoliolate leaves are present, but in 'Mount Usher' the former type is predominant.

Under cultivation, the Chilean E. glutinosa has also hybridized with the Tasmanian E. lucida, the resulting offspring bearing the collective name E. × intermedia Bausch (Kew Bulletin for 1937, p. 193). The hybrid tends to be intermediate in character, bearing both simple and pinnate leaves (the latter mostly trifoliolate), the margins of the leaves or leaflets nearly entire, or toothed in the upper half. The original form of this hybrid, known as cv. 'Rostrevor', is said to have been the result of chance insect-pollination, and originated in the gardens of Rostrevor House, Co. Down, Northern Ireland. At one time some British catalogues listed this as E. Rodgersii, but this name has no standing.

Most recently recorded is the hybrid between E. lucida and E. Moorei, which has been named E. × Hillieri by A. J. Ivens ("Journal of the Royal Horticultural Society" 78: 342 [1953]). This name commemorates Mr. H. G. Hillier of the firm of Hillier and Sons, in whose Chandlersford nursery, near Winchester, England, the original plant appeared as a self-sown seedling. This particular plant and its vegetatively propagated descendants form a clone which has been named 'Winton'. Other seedlings of the same parentage would take the name E. × Hillieri, but should be given different clonal names, if they are worthy of such distinction at all.

Eucryphia 'Winton' has leaves which are intermediate in character between those of its parents, being pinnate, with mostly 5 but up to 9 quite entire leaflets. The flowers are about 2.5 cm. across. In all probability it will prove to be an interesting rather than an especially valuable addition to the eucryphias already available.

At the September 22, 1954, meeting of the Royal Horticultural Society, another clone of E. × Hillieri was exhibited under the name of 'Penwith' by Col. Sir Edward Bolitho, but I have seen no description of this. Col. Bolitho also exhibited, at the same time, a hybrid called Eucryphia × 'Madron', but its parentage and description are unknown to me.

The flowering season for the eucryphias, in the Northern Hemisphere, is July and August. This late flowering makes them especially welcome in the garden, where relatively few woody plants are blooming at this season. The Old World eucryphias are usually the earliest to come into flower, followed by E. × intermedia, E. glutinosa, E. × nymansensis, and E. cordifolia, in that order, though there is considerable overlapping in their bloom periods.

Culturally, the eucryphias appreciate just about the same conditions as do rhododendrons: an acid, peaty soil kept cool by mulch or the shade of low-growing plants; protection from drying winds and strong sun, although some sunlight is necessary for good flower production; a temperate climate, without extremes of heat or cold; and a moderately humid atmosphere. Eucryphia cordifolia and its hybrid, E. ×nymansensis cv. 'Nymansay', have been reported to be tolerant of lime in the soil.

Eucryphia glutinosa is the hardiest species, and the hybrids E. ×nymansensis and E. ×intermedia are close behind, in that order. The Old World species rank next in hardiness, while E. cordifolia has usually proved to be the most tender. In America, E. glutinosa seems to be reliably hardy in what would be Zone VIII (if it were numbered) on the map of climatic zones in Rehder's "Manual of Cultivated Trees and Shrubs." This includes, in the West, the coastal regions of southwestern British Columbia, Washington, Oregon, and most of California west of the great mountains; in the East, extreme southeastern Virginia, south (east of the mountains) to Florida, thence west through the southern half of Alabama and Mississippi to southeastern Texas. Within this zone, factors other than the minimum winter temperatures may be limiting in some areas, however.

Propagation is effected by seeds, layering, or cuttings, the last method considered difficult, though at least E. ×nymansensis 'Nymansay' is said to be "remarkably easy" in this respect.

According to the Hortorium's records, during the past eight years the following species, hybrids, and cultivars have been offered in the American trade by the firms listed. Seeds of E. cordifolia and E. glutinosa have been offered also by Thompson and Morgan, Ltd., Ipswich, England. The names of nurseries in the British Isles able to supply these and other kinds may be had, upon request, from the Bailey Hortorium.

E. cordifolia - Clarke.
E. glutinosa (E. pinnatifolia) - Clarke, English (seeds), Schumacher (seeds).
E. ×intermedia 'Rostrevor' - Clarke, Layritz.
E. lucida (E. Billardieri) - Clarke, Menninger.
E. ×nymansensis 'Mount Usher' - Clarke.
E. ×nymansensis 'Nymansay' - Clarke, Layritz, Menninger.

The addresses of the nurserymen and firms mentioned above are:

Clarke Nursery, P. O. Box 343, San Jose 2, Calif.
Carl S. English, Jr., 8546 30th Ave., N. W., Seattle 7, Wash.
Layritz Nurseries, Ltd., Victoria, British Columbia.
Edwin A. Menninger, Stuart, Fla.
F. W. Schumacher, Jamaica Plain, Mass.

Sources of Rock Garden Plants

George H. M. Lawrence

From time to time requests are received for sources of cultural groups of garden plants. Two lists of these sources, published in earlier volumes of "Baileya," are:

House Plants - Baileya 1: 117 (1953) and 2: 35 (1954).
Native American Plants - Baileya 2: 124-125 (1954).

A list of domestic commercial sources of rock garden plants has been requested by several correspondents. The number of American firms specializing in this group of plants has been diminishing steadily since World War II - many well known a decade or more ago are now out of business. This reflects a trend in our gardening interests, for rock gardens are objects of loving care and meticulous attention and demand much maintenance from the gardener. At the same time, because of the special habitat and environmental requirements of many rock garden subjects, a greater challenge to the plantsman's skill is found here than with most temperate groups.

Aside from the sources given below, the enthusiast will gain by affiliation with the American Rock Garden Society [E. L. Totten, Secy., Ho-Ho-Kus, New Jersey] and receive its excellent seed list. The list for 1956 included over 1500 entries. Two other societies are the Scottish Rock Garden Society [J. T. Aitken, 75 Whitehouse Rd., Barnton, Scotland] and the Alpine Garden Society [C. B. Saunders, Secy., Husseys, Green St. Green, Farnborough, England]. All three issue journals of their own.

American dealers in rock garden and alpine plants are listed here alphabetically by state. Names preceded by an asterisk are of specialists. Others include rock garden material in their general listings.

*Samuel F. Bridge, Jr., Doubling Road, Greenwich, Conn. (No mail orders).
Lounsberry Gardens, Oakford, Ill.
*Wild Gardens, Saline, La.
*Merry Gardens, 1 Simonton Road, Camden, Me.
Harlan P. Kelsey, Inc., Kelsey-Highlands Nursery, East Boxford, Mass.

Julia Seide, 16 Gallison Ave., Marblehead, Mass.
Village Hill Nursery, Dorcas Brigham, Owner, Williamsburg, Mass.
Weston Nurseries, Inc., Winter St., Weston 93, Mass. - or - Frankland St., Hopkinton, Mass.
American Perennial Gardens, Box 37, Garden City, Mich.
Henry E. Saier (Pioneer Seed Co.), Dimondale, Mich.
Weller Nurseries Company, Inc., Holland, Mich.
Perkins Bros., 2591 Stillwater Road, Saint Paul 6, Minn.
*Frank H. Rose, 1020 Poplar St., Missoula, Mont.
*Mayfair Nurseries, Box 87, Hillsdale, Bergen County, N. J.
Pearce Seed Co., Moorestown, N. J.
*N. A. Hallauer, Webster, N. Y.
*Gardens of the Blue Ridge, (E. C. Robbins), Hardy Native Plants, Ashford (McDowell Co.), N. C.
*Mrs. C. W. Mason, Saluda, N. C.
Henry Kohankie & Son, Painesville, Ohio
MacPherson Gardens, 2920 Starr Ave., Toledo 5, Ohio
J. Chas. McCullough Seed Co., 230 East 4th St., P. O. Box 146, Cincinnati 1, Ohio
*Rocknoll Nursery, Morrow, Ohio
Wayside Gardens, Mentor, Ohio
*Bovees, 1737 S. W. Coronado, Oswego, Ore.
*Sherwood Nursery Co., 141 S. E. 65th Ave., Portland 16, Ore.
*Carl Starker, Jennings Lodge, Ore.
Cloud Hill Nursery, R. D. 1, Quakertown, Pa.
Hildemere Gardens, Wawa, Pa.
George W. Park Seed Co., Greenwood, S. C.
*Claude A. Barr, Prairie Gem Ranch, Smithwick, S. D.
*Alice Hills Baylor, Sky Hook Farm, Johnson, Vt.
*Sky-Cleft Gardens (Donald Allen), Camp St. Extension, Barre, Vt.
Daffodil Mart, Nuttal P. O., Gloucester, Va.
Carl S. English, Jr., 8546 30th Ave. N.W., Seattle 7, Wash.
*L. N. Roberson, 1540 E. 102nd St., Seattle 55, Wash.
*Green Pastures Gardens (D. Florine House), 2215 East 46th St., Seattle 5, Wash.
Lamb Nurseries, East 101 Sharp Ave., Spokane 2, Wash.
*Alpenglow Gardens, Michaud & Company, 1504 Trans-Canada Highway, R. R. 10, New Westminster, B. C., Canada
*Alpine Nurseries, R. R. 1, Bathurst & Sheppard Ave., York Mills, Ontario, Canada
Sheridan Nurseries, Clarkson, Ontario, Canada
Skinner's Nursery Limited, Dropmore, Manitoba, Canada
Wilcox Nurseries, Oliver, British Columbia, Canada

Hortus - Its Plan and Use

Mary Holmes Moon

"All gardeners should become plantsmen." Liberty Hyde Bailey's audience looked surprised at his statement, silently questioning the difference.

He explained that anyone who had a garden, perhaps only a window box, was a gardener, but the person with enough interest to learn more about the plants he grew was a plantsman. He was the person who each year grew some plant he had never grown before, who by his own experiments was able to grow plants better. His curiosity led him to read the histories of his plants and to seek new information about them.

Dr. Bailey made it abundantly clear that even the window gardener could become a plantsman - and he spent his life making available to him the kinds of literature to help him do this. "Hortus Second" is one of the more useful and less well known of these reference works.

The first "Hortus" was designed as "an annotated inventory of the species of plants and their main botanical varieties now in cultivation in the [continental] United States and Canada ... together with brief indications of uses and methods of cultivation." Plants known only in botanic gardens, government test grounds, and special fanciers' collections were excluded. So were accounts of most horticultural varieties - of apples, roses, irises, and other domesticated groups - for they were to be found in special books and society publications.

This first "Hortus" was, as were the editions that followed, "a handbook of ready reference ... to current nomenclature and to the spelling of the names, a present help in labelling ... and a compact register of contemporaneous resources in plant materials."

This endeavor was not a new idea, for as early as 1889 Dr. Bailey had envisioned such a continuing project. In his "Annals of Horticulture," 1889-1893, he attempted to catalogue the progress in American horticulture by publishing an annual listing of all varieties introduced during those years. The "Cyclopedia of American Horticulture" followed in 1900 to 1902 in an effort to bring knowledge of cultivated plants up to date. Five years later, "Crops," the second volume of the "Cyclopedia of American Agriculture," appeared.

The "Standard Cyclopedia of Horticulture," at first (1914-1917) in six volumes, and later in three, was his next publication. Since the beginning of this century, however, Dr. Bailey had entertained the hope that a one-volume cyclopedia would one day become a reality. In the 1900's the Macmillan Company, publishers of his books, invited him to consider revising his "Standard Cyclopedia." He took a firm stand that it should never be revised. "It must be displaced by a wholly new work," he said, "and I shall never undertake it." At the same time, he was the first to recognize that it was already outdated.

In 1924 he completed the first "Manual of Cultivated Plants" ever published anywhere. This done, he began the compilation of a new work, "a dictionary of gardening, general horticulture and cultivated plants in North America." His dream of a one-volume cyclopedia was becoming a reality. This he named "Hortus," explaining:

> It is a peculiar pleasure to bring to North America the word Hortus as the name of a book. In such usage it has long and illustrious history. Latin for "a garden," the word is also employed for a book about plants that grow in the garden.

In his preface to "Hortus," dated January 1, 1930, he gave many examples of Old World usage of the name: "Hortus Eystettinensis" of Besler; "Hortus Cliffortianus," in 1737, Linnæus' classical account of the plants in the great Dutch gardens and conservatories of George Clifford; and "Hortus Mortolensis," in 1912, by Alvin Berger, treating the plants in the famed Hanbury gardens, La Mortola, northern Italy. Bailey concluded his explanation by saying:

> There is no other available word that quite so well covers the attempt to compile a descriptive document of the plants in cultivation in a given time or place or region. The present work is a Hortus Americanus.

Dr. Bailey planned to issue a supplement at five year intervals between editions, but this was actually done only in 1935. The second edition of the original work, revised and reset, appeared in 1941. "Hortus Second" passed through its eighth printing in 1956. The third edition, "Hortus III," is not yet complete.

The format of "Hortus" is similar to that in any dictionary. Alphabetical treatment makes it simpler to locate a particular plant - whether by the Latin name of its genus and species or by the English common name. Abundant cross-referencing makes it fairly simple to find the treatment of a plant one wishes to read about. However, it may sometimes be difficult to locate it by the common name. For example, blue grass is listed under "grass, blue : Poa" (p. 340, "Hortus Second"). And Sweet William does not follow Sweetsop (p. 715) but appears under Sweet (on p. 714). The notation guides the user to the scientific name of its genus and species, where complete information will be found. One recogniz-

ed deficiency in the entire "Hortus" series is that too few common names are included, handicapping the gardener who knows only such a name. The attempt will be made, in "Hortus III," to alleviate this difficulty.

In its short 778 pages, "Hortus Second" nearly attains the proportions of the one-volume cyclopedia Bailey proposed. It includes cultural articles on bedding, citrus fruits, propagation, berries, vegetables, and other subjects. In concise yet detailed explanation, one may learn the following about lawns: suitable grasses and grass substitutes, soil preparation, planting time, sodding versus seeding, maintenance, fertilizers, sprays, and weed destruction. Comparable treatment is given to other important garden topics.

The layman-gardener need not put "Hortus Second" aside because of the technical terms employed in the text, for definitions of variety, species, genus, clone, etc. are included. To further simplify its use, the terms that describe plant parts are illustrated in the frontispiece and defined in appropriate alphabetic sequence.

Jatropha 398 *Juncaceæ*

Amer.—Planted in warm countries and sometimes seen under glass.

texàna: *Cnidoscolus texanus.*

JEFFERSÒNIA. *Berberidaceæ.* Two small per. herbs native in E. N. Amer. and Asia, the former transferred from the woods: lvs. basal, palmately veined or lobed: fls. white, solitary at tip of slender scape: fr. a leathery caps.

diphýlla. TWIN-LEAF. To 1 ft.: lvs. 2-parted into kidney-shaped entire or lobed divisions, glaucous beneath: fls. 1 in. across. May. Ont. to Va. and Tenn.

dúbia. Young lvs. cordate, margins irregularly angled: petals oblong, very obtuse, narrowed into a short claw: fls. bluish. China.

JERUSALEM CROSS: *Lychnis chalcedonica.*

JESSAMINE: *Jasminum, Cestrum.* **Carolina Yellow:** *Gelsemium sempervirens.* **Orange-:** *Murræa.*

JETBEAD: *Rhodotypos tetrapetala.*

JEW-BUSH: *Pedilanthus tithymaloides.*

JEWEL VINE, MALAY: *Derris scandens.*

JEWEL-WEED: *Impatiens biflora.*

JIMSON-WEED: *Datura Stramonium.*

JOBS-TEARS: *Coix Lacryma-Jobi.*

JOE-PYE WEED: *Eupatorium dubium, maculatum, purpureum.*

JOINTED: with nodes, or points of real or apparent articulation.

JOINT-FIR: *Ephedra.*

JOINTWOOD: *Cassia nodosa.*

JONQUIL: *Narcissus.*

JOSEPHS-COAT: see *Amaranthus tricolor.*

JOSHUA-TREE: *Yucca brevifolia.*

JOVELLÀNA. *Scrophulariaceæ.* Herbs or small shrubs from Chile and New Zeal., allied

seeded, drupe-like with fibrous flesh.—In Chile sugar or "honey" is made from the sap, and the nuts are employed in confectionery.

JUDAS-TREE: *Cercis.*

JUGLANDÀCEÆ. WALNUT FAMILY. Six woody monœcious genera in the north temp. zone, having alternate pinnate lvs., staminate fls. in hanging catkins with 3-many stamens and with or without perianth, pistillate fls. with 3–5-lobed calyx and inferior ovary and borne a few together or in racemes, and fr. a nut, winged nutlet, or drupe. Carya, Juglans, Platycarya and Pterocarya are grown for ornament, shade, and for the edible nuts; many of the species are timber trees.

JÚGLANS. WALNUT. *Juglandaceæ.* Conspicuous deciduous monœcious trees with large odd-pinnate lvs., staminate fls. in drooping catkins from last-year wood, pistillate fls. on wood of current year, and fr. a furrowed nut inclosed in a thick indehiscent husk. Walnuts may be distinguished from hickories in part by the pith of the twigs chambered or with minute cross-partitions in the former and solid or continuous in the latter. Grown for ornament, the edible nuts, and for timber used in building and making of furniture. For cult. see *Walnut.*

ailanthifòlia: *J. Sieboldiana.*

califórnica. CALIFORNIA W. Shrub or tree to 60 ft.: lvs. of 9–17 ovate-lanceolate lfts. to 3 in. long: fr. globose, ¾ in. across, pubescent. S. Calif.

cathayénsis. CHINESE W. To 80 ft.: lvs. of 9–17 ovate-oblong lfts. to 6 in. or more long, pubescent beneath: fr. ovoid, to 2 in. long, pointed, sticky-pubescent, nut thick-shelled. China.

cinèrea. BUTTERNUT. To 100 ft.: lvs. of 11–19 pubescent

Fig. 40. Reproduction of portion of page 398, "Hortus Second," slightly reduced.

The account for each genus includes a description of its characteristics, nativity, and cultural requirements. The cultivated species and varieties follow alphabetically, with identifying descriptions. Incorrect names that are used in the trade are included, with a reference to the correct names. The nearly full-size reproduction (fig. 40) of page 398 in "Hortus Second" illustrates the essential arrangement of the references. The genus Jeffersonia is listed in the left-hand column of the double-columned page, with information as to the family to which it belongs, the generic description, and its two cultivated species. Below this are common names cross-referenced to their genera and species. On the right, the walnut family, Juglandaceæ, is concisely described, including the names of the four genera (out of six known for the family) which are cultivated. Under this is the genus treatment for Juglans, and its cultivated species. The description of the species J. californica begins, "Shrub or tree to 60 ft." Some find this method of indicating a plant's dimensions inadequate, preferring to know the lower limit of growth as well. As Dr. Bailey explained in his introduction, "'to 5 ft.' suggests the plant may attain that height as a characteristic of the species, whatever may be the usual or average height in the garden." Many factors may cause the plant to grow taller or shorter than the given height.

The use of Latin names is another cause for concern to those who feel it is "academic" to use them in ordinary speech. However, Latin is used universally in plant nomenclature because it is internationally known. The International Code of Botanical Nomenclature prescribes that it be used, for the use of common names, in English or any other language, may lead to confusion for those who do not know the tongue. It is the mark of a plantsman that he is familiar with the Latin name, whether or not he uses it in daily conversation.

Now in its sixth printing, "Hortus Second" is still a standard work. However, since its publication in 1941, nearly 6,000 plant-names have appeared in the trade that were not known in the American trade in 1940. From 500 to 800 of these names are estimated to be manufactured or "new" names for plants whose true names - the historically accepted botanical names - have been ignored, or inadvertantly or deliberately replaced in the trade. "Hortus III" will include these "trade names" and any that may be introduced before its publication in 1960. Research necessary to identify these misnamed plants and to revise the previous work has delayed its publication beyond the ten year period Dr. Bailey proposed for the new edition. The revision of Dr. Bailey's "Manual of Cultivated Plants," which appeared in 1949, also delayed the program for "Hortus III."

Nevertheless, there is at present no comparable reference work of the scope of "Hortus Second." Plantsman and gardener will continue to keep its pages well thumbed until the new edition appears.

The Flowering Rush

William J. Dress

An attractive and easy-to-grow shallow-water plant suitable for the small artificial pool is the Flowering Rush, Butomus umbellatus Linnæus. Although widely used as an ornamental in aquatic gardens in Europe, where it is also native, only a few commercial plantsmen offer it for sale in this country.

The Flowering Rush is a quite hardy perennial, with a thickish creeping rootstock or rhizome which produces a close series of narrow, erect, rapier-like leaves from 5 to 10 dm. or more high. These are triquetrous, or three-angled in cross-section, in the lower part, and somewhat twisted in the upper. The flowering scapes, which are produced all summer long, equal or overtop the leaves and bear at their summits solitary umbels of numerous, slender-pedicelled pink flowers about 2 cm. in diameter.

Superficially, the umbellate inflorescence with its three subtending bracts, and the six-parted perianth, remind one of some members of the family Amaryllidaceæ, especially certain ornamental alliums. An examination of the sexual organs at once dispels that illusion, however, for there are nine, rather than six, stamens, and six separate simple pistils, rather than a single compound pistil, present in each flower.

Butomus umbellatus is the only species of its genus; it and four or five other genera are usually taken to comprise the family Butomaceæ, closely related to the Alismaceæ (the water-plantains, sagittarias, etc.). These two families represent some of the most primitive groups of monocotyledonous plants existing today.

Native to most of Europe and northern Asia, B. umbellatus is now also firmly established on this continent in the lower Great Lakes region and along the St. Lawrence River. Although now very abundant in some of these areas, it appears to have been first noticed here in a wild condition only as early as 1897. It can be a very invasive weed, if given suitable growing conditions, and for this reason it perhaps ought not be introduced to natural ponds or stream edges, or even large artificial pools where control might be difficult. In a small pool or in restricted areas of wet or marshy ground, however, it makes a desirable ornamental. It spreads by the creeping rhizomes, by readily separable tiny tubers borne along these

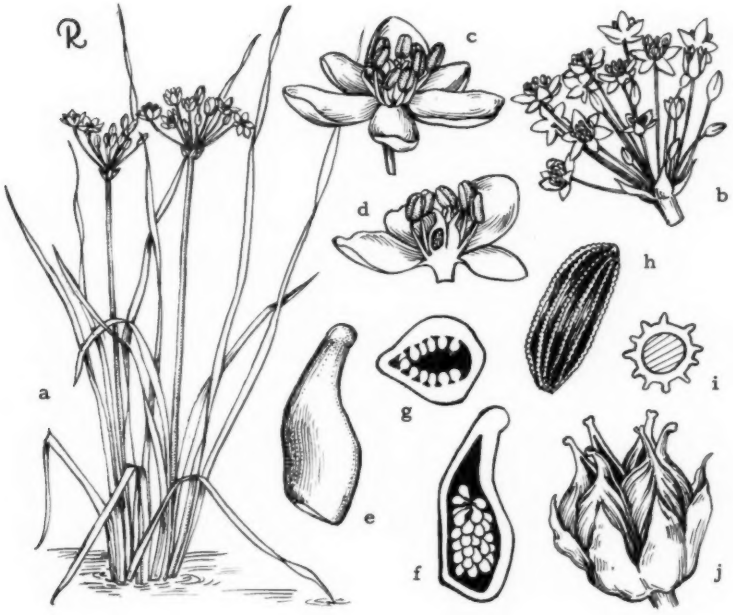


Fig. 41. Butomus umbellatus: a, habit; b, inflorescence x 1/2; c, flower x 1 1/2; d, flower, vertical section x 1 1/2; e, a single pistil x 6; f, pistil, vertical section x 6; g, pistil, cross section x 8; h, seed x 16; i, seed, cross-section x 16; j, fruit x 3.

rhizomes in late summer, by seeds, and, in the case of some forms, by tiny bublets produced in the inflorescence.

In soil very moist or covered with up to 15 or 20 cm. of water, the Flowering Rush grows and flowers very well. In really deep water, however, the leaves remain submersed or have floating tips, and tend to be elongated (to 2 m. long), slender, and flaccid. Under such conditions the plants do not flower. This phase has been referred to as forma[1] vallisneriifolius (Sagorski) Glück, in allusion to the similarity of the leaves to those of species of Vallisneria, the eel-grasses.

[1] A forma of this sort is technically known as an "ecad," a term denoting a variant which owes its modified character entirely to the influence of the environment. Plants of forma vallisneriifolius, for instance, would revert to the "normal" or usual form of B. umbellatus if allowed to grow in the shallow water in which the latter is usually found.

A form with variegated leaves, B. umbellatus 'Variegatus', is in cultivation in Europe, but is not vigorous and so is seldom seen. The flowers of B. umbellatus are reported to vary sometimes in depth of hue, and even to be white in occasional plants, but no color forms are available as such in the trade.

The few firms in America which, according to our records, at present offer the Flowering Rush for sale follow:

Beldt's Aquarium, Inc., P. O. Box 146, Robertson, Missouri; S. Scherer and Sons, Waterside Ave., Northport, L. I., N. Y.; William Tricker, Inc., Saddle River, N. J., and Independence, Ohio.

The last book written by Liberty Hyde Bailey was "The Garden of Bellflowers," an abundantly illustrated horticultural monograph of the Campanula family. The Macmillan Company, publishers of this volume, advise us that fewer than 1,000 copies of the book remain, and that they have no plans to reprint it. This suggests that the book soon will be out of print. Because we feel it is destined to become a collector's item, we take this opportunity to advise "Baileya" readers of the situation so that they may consider it for either their own libraries or as a Christmas gift. Copies may be had from any bookseller, the publishers, or the Bailey Hortorium. The price: $5.00, postpaid.

G. H. M. L.

Book Reviews

"Pioneers of Gardening," by Miles Hadfield. 240 pp., with 14 pp. of line drawings by the author. Routledge and Kegan Paul, Ltd., London. 1955. Price: 15 shillings ($2.10).

Those of us who spend our lives in close proximity to university or institutional libraries, storehouses rich in ponderous (but not necessarily dull) tomes wherein are chronicled the histories of men and ideas, tend to forget how little of this information is readily available to our more prosperous, though less fortunately situated, friends. Likewise, confronted by these riches, we are frequently content to confine our attention to some small corner of the field of knowledge, oblivious to how "our" facts and people interrelate with facts and people in other spheres. Contemporary botanists are apt to know little of horticulture or of garden design. Contemporary horticulturists and landscapists are apt to be unaware of the ultimate sources, or history, of the plants which they grow and use. It is pleasant, then, to notice the publication of a choice salmagundi which gives us a bit of background concerning the development of our ideas of garden-design and the denizens thereof.

Miles Hadfield, an engineer turned artist and author, is probably better known in England than in the United States - if only because all of his books have been published there and not here. Some people, I suppose, would be inclined to curse him as a dilettante, interested in impractical things like gardens, and odd and useless scraps of information about plants which can't be eaten and people who did nothing but grow them. For those of us, however, who have some curiosity as to how and why things got to be as they are, Miles Hadfield is a friend indeed.

"Pioneers of Gardening" is a brief, episodal history of how we came to have our present tastes in garden-design and how we came to have certain plants in our garden. To quote the Introduction, "We shall follow a zigzag course in choosing heroes, some more or less architects, some scientists, others founders of great botanic gardens - and some merely great gardeners....Many of those who write about the great people of the past have patiently and cleverly routed out the most minute details of what their heroes and heroines did in their daily life, how they looked and behaved. The result is quite often rather flattering to you and me: the great ones turn out to be no better persons than we are. But this method of turning heroes into ordinary people has one big fault: it tends to make us overlook the real difference between them and us - that is,

the significant buildings they designed, the pictures they painted, the music they composed or the gardens they made. All these are quite beyond our capacity."

There is something here for nearly everybody - the story of the rise and fall of the formal garden, the "natural" landscape, Victorian bedding, and the introduction of the present informal garden. Perhaps we can get some glimpse of the way the formal garden developed out of the neat little plots in the early monastery gardens - and how the formal bedding of the Victorian era is related thereto. And perhaps we will guess how the "natural" landscape is related to Rousseau and the French Court. But there is much more than this - we are told about Thomas Knight and his fruit trees, Gregor Mendel and his peas, Siebold and Fortune, Loudon and Paxton, the Fathers David and Delavay, Wilson and Forrest and Farrer - and also Dr. Nathaniel Ward. We are told a little of whom these people knew, and what they did, all in an easy and engaging fashion. The person who wants to know Where, and Why, and How, will find this a good place to start.

G. P. DeW.

"Ground Cover Plants," by Donald Wyman. 175 pp., with 16 pp. of halftone illustrations. The Macmillan Company, New York. 1956. Price: $4.75.

This new book of Dr. Wyman's covers an aspect of landscaping which has not been previously treated so comprehensively, but which is of great interest and importance today. Contemporary landscape gardening makes special use of ground cover plants for their textural or color masses and for their low maintenance requirements. Present-day concern with roadside beautification also has added to the importance of plants of this type, many of which are ideal covers for the raw road-cuts and denuded slopes which inevitably result from highway construction.

The first one-third of the book is devoted to chapters on culture, maintenance, propagation, and other general subjects pertaining to ground cover plants. Although these might be instructive to a beginning gardener, most horticulturists will find little in them that they have not already learned elsewhere.

More valuable are the sections on "Ground Covers for Special Purposes" and the "Alphabetical List of Plants Used as Ground Covers," which comprise, with the index, the remainder of the book.

The special-purpose lists are very useful when one must find a plant to meet the demands of a particular situation, or when one desires a particular effect, and with their help one may be spared much brain-racking and searching about. Twenty such lists are provided, based on characters of the plants themselves (rapidity of increase, foliage color, etc.) or on their suitability for special or exacting conditions (dry, wet, or acid soils, shady places, etc.).

The alphabetical list includes 184 species, hybrids, and major varieties of plants considered by Dr. Wyman to be qualified for use as ground cover material "in the central and northern parts of North America." For each of these are tabulated essential characteristics, followed by a paragraph of discussion of the plant's merits, uses, and other items of interest. Under some species are listed a few to many variants - natural varieties or cultivars - which may be used in addition to the typical forms. It is the inclusion of these listed variants which permits the dust-jacket to mention a description of "more than 200 kinds" and the Introduction to claim "a listing and description of over 250 plants" for the book.

From this rich catalogue of material one should be able to discover at least a few to suit any personal or situational demands. The list is by no means exhaustive, however, for a number of plants eminently suited for ground cover use have been omitted; species of Acæna, Coptis, Ephedra, Opuntia (especially O. humifusa, which can completely cover the most difficult of dry, rocky, or sandy banks) and Alyssum saxatile, Cotula squalida, Crucianella stylosa, Dryas octopetala, Lathyrus perennis, Matricaria Tchihatchewii (the Turfing Daisy), Oxalis montana, Taxus baccata 'Repandens' and T. canadensis come readily to mind, and each has peculiar virtues and value for certain situations. The ferns, also, have been unjustly passed over with only a short paragraph, in the first chapter, stating that "they are not discussed or listed....for their culture is sometimes tricky, and conditions under which they can be properly grown are specialized." This is an invalid pronouncement, for many ferns capable of forming beautiful ground covers in the shade (and some even in the sun) and which may be found in the yards and gardens of even those who make no pretence at being gardeners, are not at all difficult to grow. The species of Andromeda, Chiogenes, Ledum, Linnæa, and Shortia which have been included as possible ground covers are certainly much more exacting in their requirements than almost any hardy fern, some so much so that they are really subjects for the connoisseur and expert, and are likely seldom to be used as ground covers.

Although short, the description of each plant is sufficient to set forth its gross characteristics. In a few instances, the plants with which Dr. Wyman is concerned seem to have been misidentified, and then one has the impression that his comments and descriptions of them are compounded from personal observations of the plants

themselves and from information drawn from other sources but pertaining to the plant to which the name rightfully belongs. Two of the Arenaria species seem to be confused with other plants. Dr. Wyman's A. montana, with its height of 2-4 in., "leaves....glossy green, and grasslike," its "general mosslike character," does not well agree with the true A. montana Linnæus, which is a relatively coarse plant superficially not unlike a species of Cerastium. The Arenaria verna cæspitosa of this book is rather evidently not a form of A. verna Linnæus, but rather the plant which is so commonly though erroneously distributed in the trade under that name - namely, Sagina subulata (or occasionally, Sagina procumbens). Arenaria verna in reality is not very commonly cultivated, and definitely cannot be considered "possibly the lowest of the three sandworts," when A. balearica is one of those three. The statement under Sagina subulata, that the latter "is similar to Arenaria species, except that the leaves of the pearlwort [S. subulata] are mostly shorter than those of the arenarias described in the list," also indicates that Dr. Wyman's A. verna cæspitosa was a Sagina species, for the true thing does not resemble the latter. I wager that the reference to the difference in leaf-length is only Dr. Wyman's concession to measurements as given in other literature and was not based on the plant material he had in mind.

The description of Artemisia stelleriana is another in which two species seem to have been confused. As described, it seems to be something other than A. stelleriana. The photograph labelled with this name definitely depicts some other Artemisia species.

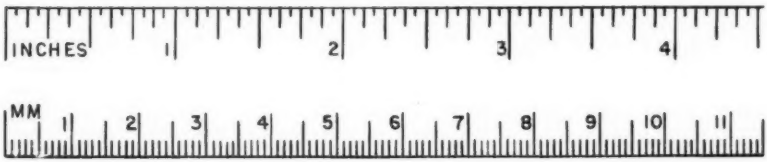
With a few exceptions, the nomenclature throughout the work is up-to-date and in agreement with that used by other authorities. Stachys olympica is the name now accepted as correct for the plant listed as Stachys lanata, however. The author has failed to follow the recommendation of the International Code of Botanical Nomenclature (1952) that, when an epithet is taken from the name of a man and that name ends in a consonant (excepting -er), the letters "ii" should be added. In the specific epithets beani, kirilowi, mussini, requieni, veitchi, and in the varietal epithet sargenti, this has not been done.

W. J. D.

Persons interested in biographical sketches of some of the men responsible for our early knowledge of plants of Washington and Oregon will wish to read the scholarly paper, by Professor Erwin F. Lange of Portland State College, titled "Pioneer botanists of the Pacific Northwest" and published recently in the Oregon Historical Quarterly 57: 109-124, (June) 1956.

ABBREVIATIONS USED IN BAILEYA

ann.	annual	dm.	decimeter	lf.	leaf
bien.	biennial	fl.	flower	lft.	leaflet
br.	branch	fls.	flowers	lvs.	leaves
brt.	branchlet	flt.	floret	mm.	millimeter
caps.	capsule	fr.	fruit	per.	perennial
cl.	clone	ft.	foot	segm.	segment
cm.	centimeter	hort.	horticultural	st.	stem
cv.	cultivar	in.	inch	sts.	stems
diam.	diameter	infl.	inflorescence	var.	variety

METRIC - ENGLISH EQUIVALENTS (approximate)

6 mm. - 1/4 in.	10 cm. - 4 in.	10 mm. - 1 cm.
12 mm. - 1/2 in.	1 dm. - 4 in.	10 cm. - 1 dm.
25 mm. - 1 in.	3 dm. - 1 ft.	10 dm. - 1 meter
2.5 cm. - 1 in.	10 dm. - 1 yd.	
5 cm. - 2 in.	1 m. - 39 in.